

CLAIMS

1. A drive apparatus comprising:
 - a first electric motor (2) for motoring to raise an engine (1) to a speed for an ignition; and
 - a control unit (U) for controlling said engine and said first electric motor, characterized:
 - in that said control unit makes a prepositioning control for controlling the first electric motor with a torque output so that the engine being stopped to run may be positioned at a predetermined crank-shaft position.
2. A drive unit as set forth in Claim 1, characterized:
 - in that said control unit causes the first electric motor to output a torque short of a torque necessary for running the engine continuously.
3. A drive unit as set forth in Claim 2, characterized:
 - in that said control unit causes the first electric motor to output an arbitrary constant torque.
4. A drive unit as set forth in Claim 3, characterized:
 - in that said control unit causes said constant torque to be outputted only for a predetermined time.
5. A drive unit as set forth in Claim 4, further comprising:
 - first crank-shaft position detecting means for detecting the crank-shaft position, characterized:
 - in that said control unit makes said predetermined time

variable according to the difference between a present crank-shaft position and said predetermined crank-shaft position.

6. A drive unit as set forth in Claim 1, further comprising:
second crank-shaft position detecting means for detecting said predetermined crank-shaft position, characterized:

in that said control unit causes the first electric motor to output a torque till the crank-shaft is positioned at said predetermined crank-shaft position.

7. A drive unit as set forth in Claim 6, characterized:
in that said control unit causes the first electric motor to output a variable torque.

8. A drive unit as set forth in Claim 7, further comprising:
first crank-shaft position detecting means for detecting the crank-shaft position, characterized:

in that said control unit causes said variable torque to be outputted according to the difference between a present crank-shaft position and said predetermined crank-shaft position.

9. A drive unit as set forth in Claim 8, characterized:
in that said control unit has a variable torque map predetermined according to the difference said present crank-shaft position and said predetermined crank-shaft position.

10. A drive unit as set forth in Claim 8 or 9, characterized:

in that said variable torque is a torque along the cranking torque of the engine.

11. A drive unit as set forth in any of Claims 1 to 10, characterized:

in that said predetermined crank-shaft position is the position at which the cranking torque of the engine is the highest.

12. A drive unit as set forth in any of Claims 1 to 11, further comprising:

a second electric motor (3), characterized:

in that the engine, the first electric motor and the second electric motor are mechanically connected to a wheel (9); and

in that said control unit controls the second electric motor so as to absorb the fluctuation in the torque to be outputted to the wheel during said prepositioning control.

13. A drive unit as set forth in Claim 12, characterized:

in that said control unit calculates the fluctuation of the torque to be outputted to said wheel, from the torque outputted by the first electric motor.

14. A drive unit as set forth in Claim 12, characterized:

in that said control unit controls the second electric motor on the basis of a first torque correction map predetermined according to said prepositioning control.

15. A drive unit as set forth in Claim 14, characterized:

in that said control unit causes said first electric motor

and said second electric motor to output torques simultaneously.

16. A drive unit as set forth in any of Claims 1 to 15, characterized:

in that said control unit executes said prepositioning control prior to the motoring.

17. A drive unit as set forth in Claim 16, characterized:

in that said control unit controls the speed of the first electric motor at the motoring time.

18. A drive unit as set forth in Claim 16, characterized:

in that said control unit controls the torque of the first electric motor at the motoring time.

19. A drive unit as set forth in Claim 18, characterized:

in that said control unit controls the torque of the first electric motor on the basis of a predetermined map.

20. A drive unit as set forth in any of Claims 16 to 19, characterized:

in that said control unit controls the second electric motor so as to absorb the torque fluctuation to be outputted to the wheel at the motoring time.

21. A drive unit as set forth in Claim 20, characterized:

in that said control unit calculate the fluctuation of the torque to be outputted to said wheel, from the torque outputted by the first electric motor.

22. A drive unit as set forth in Claim 20, characterized:

in that said control unit controls said second electric

motor on the basis of a second correction map predetermined according to the motoring.

23. A drive unit as set forth in any of Claims 20 to 22, characterized:

in that said control unit further controls the second electric motor on the basis of a third torque correction map predetermined according to the crank-shaft position of the engine.

24. A drive unit as set forth in Claim 22 or 23, characterized:

in that said control unit causes said first electric motor and said second electric motor to output torques simultaneously.

25. A drive unit as set forth in any of Claims 16 to 24, characterized:

in that said control unit makes said prepositioning control if the drive demand of the driver is no more than a predetermined value.

26. A drive unit as set forth in any of Claims 1 to 15, characterized:

in that said control unit executes said prepositioning control subsequent to the engine running stop which is caused by lowering the engine run forcibly by a generator after a fuel cut.

27. A drive unit as set forth in Claim 26, characterized:

in that said control unit controls the second electric motor so as to absorb the fluctuation of the torque to be outputted

to the wheel while said engine run being forcibly lowered.

28. A drive unit as set forth in any of Claims 1 to 27, further comprising:

a one-way clutch (8) for blocking the reverse run of the engine.

29. A drive apparatus comprising:

a first electric motor (2) for motoring to raise an engine (1) to a speed for an ignition; and

a control unit (U) for controlling said engine and said first electric motor, characterized:

in that said control unit controls the first electric motor so that the cranking torque during the motoring may be a predetermined torque.